

## WHAT IS CLAIMED IS

1. A system for electrochemical assay of nitro-aromatic compounds, comprising:
  - (a) a working electrode having a surface that is modified by treatment thereof with at least one chemical modifier that increases electron transfer kinetics of the nitro-aromatic compounds.
2. The system, according to claim 1, wherein said at least one chemical modifier includes an aromatic organic compound.
3. The system, according to claim 1 wherein said at least one chemical modifier includes a chemical selected from the group consisting of amino-aromatic compounds, alkyl-aniline compounds, halide derivatives of alkyl aniline compounds and hydroxyl-aniline compounds.
4. The system, according to claim 1, wherein said at least one chemical modifier includes a chemical selected from the group consisting of phenylene-diamine, diphenylene-diamine, and diphenylene-triamine.
5. The system, according to claim 1, wherein said at least one chemical modifier, includes aniline.
6. The system, according to claim 1, wherein said working electrode includes at least one element selected from the group consisting of carbon and gold.

7. The system, according to claim 1, wherein said working electrode includes submicron particles.

8. The system, according to claim 1, wherein said working electrode includes a coating of elemental gold.

9. The system, according to claim 1, wherein said working electrode includes carbon paper.

10. The system, according to claim 1, further comprising,

(b) an electrolyte for dissolving the nitro-aromatic compounds;

wherein said electrolyte is chosen to minimize background current resulting from oxygen reduction.

11. The system , according to claim 10 , further comprising

(c) a mechanism for inputting air suspected to include the nitro-aromatic compounds, into said electrolyte in order to dissolve the nitro-aromatic compounds in said electrolyte.

12. The system, according to claim 10, wherein said electrolyte includes a solvent selected from the group consisting of aprotonic solvents, and organic dipolar solvents.

13. The system, according to claim 10, wherein said electrolyte includes a solvent selected from the group consisting of dimethylformamide, acetonitrile, propylene carbonate.

14. The system, according to claim 10, wherein said electrolyte includes a solvent selected from the group consisting of ethanol, propanol, ethylene-glycol, and propylene-glycol.

15 An electrochemical method of assaying trace compounds in air, comprising the steps of:

- (a) dissolving the trace compounds in an electrolyte that includes a solvent selected from the group consisting of aprotic solvents, and organic dipolar solvents;
- (b) immersing a working electrode in said electrolyte;
- (c) applying a varying potential to said working electrode;
- (d) measuring an electrical current consequent to said varying potential, thereby providing measurement results indicative of a concentration of the trace compounds.

16. The electrochemical method, according to claim 15, further comprising the step of :

- (e) regenerating said working electrode by applying a negative potential to said working electrode.

17. The electrochemical method, according to claim 15, wherein said dissolving includes bubbling air containing the trace compounds through said electrolyte.

18. The electrochemical method, according to claim 15, further comprising the step of, prior to said dissolving:

(e) measuring a background electrical current, while said applying a varying potential, thereby obtaining background current results.

19. The electrochemical method, accord to claim 18, further comprising the step of:

(g) subtracting said background current results from said measurement results, thereby obtaining calibrated measurement results.

20. The electrochemical method, according to claim 15, wherein said electrolyte includes a solvent selected from the group consisting of dimethylformamide, acetonitrile, propylene carbonate.

21. The electrochemical method, according to claim 20, wherein said electrolyte further includes a solvent selected from the group consisting of ethanol, propanol, ethylene-glycol, and propylene-glycol.

22. The electrochemical method, according to claim 15, wherein said electrolyte has a pH greater than 7.

23. The electrochemical method, according to claim 15, further comprising the step of, prior to said dissolving:

(e) preconditioning said working electrode thereby increasing electron transfer kinetics of the trace compounds.

24. The electrochemical method, according to claim 23, wherein said preconditioning includes modifying a surface of said working electrode with a

chemical selected from the group consisting of amino-aromatic compounds, alkyl-aniline compounds, halide derivatives of alkyl aniline compounds and hydroxyl-aniline compounds.

25 An electrochemical method of assaying nitro-aromatic compounds in air, comprising the steps of:

- (a) dissolving the nitro-aromatic compounds in an electrolyte that includes a solvent selected from the group consisting of aprotic solvents, and organic dipolar solvents;
- (b) immersing a working electrode in said electrolyte;
- (c) applying a varying potential to said working electrode;
- (d) measuring an electrical current consequent to said varying potential, thereby providing measurement results, indicative of a concentration of the nitro-aromatic compounds.